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Standard Specification for WELDED DEFORMED STEEL WIRE FABRIC FOR CONCRETE REINFORCEMENT¹

This standard is issued under the fixed designation A 497; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval.

This specification has been approved for use by agencies of the Department of Defense and for listing in the DoD Index of Specifications and Standards.

1. Scope

1.1 This specification covers welded wire fabric made from cold-worked, deformed wire, or a combination of deformed and nondeformed wires, to be used for the reinforcement of concrete.

NOTE 1—The values states in inch-pound units are to be regarded as the standard.

2. Applicable Documents

2.1 ASTM Standards:

A 82, Specification for Cold-Drawn Steel Wire for Concrete Reinforcement²

A 496, Specification for Deformed Steel Wire for Concrete Reinforcement²

A 700 Recommended Practices for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment³

2.2 Military Standards:

MIL-STD-129 Marking for Shipment and Storage⁴

MIL-STD-163 Steel Mill Products Preparation for Shipment and Storage⁴

2.3 Federal Standard:

Fed. Std. No. 123 Marking for Shipments (Civil Agencies)⁴

3. Description of Term

3.1 *Welded Wire Fabric*, as used in this specification, designates a material composed of cold-drawn steel wires "as drawn" or galvanized, fabricated into sheet (or so-called "mesh") formed by the process of electric welding. The finished material shall consist essentially of a series of longitudinal and transverse wires arranged substantially at right angles to each other and welded together at all points of in-

tersection.

4. Ordering Information

4.1 Orders for material to this specification shall include the following information:

- 4.1.1 Quantity (weight or square area),
- 4.1.2 Name of material (welded deformed wire fabric for concrete reinforcement),
- 4.1.3 Wire spacing and sizes,
- 4.1.4 Length and width of sheets or rolls,
- 4.1.5 Packaging (see Section 19), and
- 4.1.6 ASTM designation and date of issue.

NOTE 2—A typical ordering description is as follows: 10 000 ft² welded deformed wire fabric for concrete reinforcement, 6 x 12-D6 x D4, in flat sheets 96 in. wide by 240 in. long, in secured lifts, in accordance with ASTM A 497 dated ____.

5. Grade of Wire

5.1 The wire used in the manufacture of welded wire fabric shall conform to Specification A 496, either solely or in combination with Specification A 82.

6. Fabrication

6.1 The wires shall be assembled by automatic machines or by other suitable mechanical means which will assure accurate spacing and alignment of all members of the finished fabric.

This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel and Related Alloys, and is the direct responsibility of Subcommittee A01.05 on Steel Reinforcement.

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² Annual Book of ASTM Standards, Part 4.

³ Annual Book of ASTM Standards, Parts 1, 3, 4, and 5.

⁴ Available from Naval Publications and Forms Center, 5801 Tabor Ave., Philadelphia, Pa. 19120.

6.2 Longitudinal and transverse members shall be securely connected at every intersection by a process of electrical-resistance welding which employs the principle of fusion combined with pressure.

6.3 Wire of proper grade and quality when fabricated in the manner required in this specification shall result in a strong, serviceable, mesh-type product having substantially square or rectangular openings. It shall be fabricated and finished in a workmanlike manner, shall be free from injurious imperfections, and shall conform to this specification.

7. Mechanical Requirements

7.1 All wire of the finished fabric shall meet the minimum requirements for tensile properties and shall also withstand the bend test as prescribed for the wire before fabrication in Specification A 496 and, where applicable, Specification A 82.

7.2 In order to assure adequate weld shear strength between longitudinal and transverse wires, weld shear tests as described in 7.2 shall be made. The minimum average shear value in pounds-force shall be not less than 20 000 multiplied by the area of the larger wire in square inches (or in newtons shall not be less than 138 multiplied by the area in square millimeters) where the area of the smaller wire is 35 % or more of the area of the larger wire, and provided that the smaller wire is not smaller than D-4.

7.3 Fabric having a relationship of larger and smaller wires other than that covered in 7.2 shall meet an average weld shear strength requirement of not less than 800 lbf (3.6 kN) provided that the smaller wire is not smaller than D-4.

8. Tension Tests and Weld Shear Tests

8.1 Tests for determination of conformance to the requirements of 7.1 may be made on the welded wire fabric after fabrication either across or between the welds. Not less than 50 % of the samples tested shall be across a weld.

8.2 Weld shear tests for determination of conformance to the requirements of 7.2 shall be conducted using a fixture as described in Section 11.

8.3 Four welds selected at random from a specimen representing the entire width of the fabric shall be tested for weld shear strength.

The material shall be deemed to conform to the requirements for weld shear strength if the average of the four samples complies with the values stipulated in 7.2. If this average fails to meet the prescribed minimum value, all the welds across the specimen shall then be tested. The fabric will be acceptable if the average of all weld shear test values across the specimen meets the prescribed minimum value.

9. Bend Tests

9.1 The bend test shall be made on a specimen between the welds.

10. Test Specimens

10.1 Test specimens for testing tensile properties shall be obtained by cutting from the finished fabric units of suitable size to enable proper performance of the intended tests.

10.2 Specimens used for testing tensile properties across a weld shall have the welded joint located approximately at the center of the wire being tested, and the cross wire forming the welded joint shall extend approximately 1 in. (25 mm) beyond each side of the welded joint.

10.3 Test specimens for determining weld shear properties shall be obtained by cutting from the finished fabric a section, including one transverse wire, across the entire width of the sheet or roll. From this specimen four welds shall be selected at random for testing. The transverse wire of each test specimen shall extend approximately 1 in. (25 mm) on each side of the longitudinal wire. The longitudinal wire of each test specimen shall be of such length below the transverse wire so as to be adequately engaged by the grips of the testing machine and of such length above the transverse wire that its end shall be above the center line of the upper bearing of the testing device.

10.4 Tests for conformance to dimensional characteristics shall be made on full sheets or rolls.

10.5 If any test specimen shows imperfections or develops flaws, it may be discarded and another substituted.

11. Weld Shear Test Apparatus and Methods

11.1 As the welds in welded wire fabric contribute to the bonding and anchorage value of the wires in concrete it is imperative that the weld acceptance tests be made in a jig which will stress the weld in a manner similar to

which it is stressed in concrete. In order to accomplish this the longitudinal wire in the jig must be stressed in an axis close to its center line. Also the transverse wire must be held closely to the longitudinal wire, and in the same relative position, so as to prevent rotation of the transverse wire.

11.2 Figure 1⁵ shows the complete details of a typical testing jig together with two anvils which make it possible to test welds for wires up to $\frac{5}{8}$ in. (15.88 mm) in diameter. This testing jig can be used in most tension testing machines and should be hung in a ball and socket arrangement at the center of the machine. This, or a similarly effective fixture designed on the same principle, is acceptable.

11.3 Test specimens should be inserted through the notch in the anvil using the smallest notch available in which the longitudinal wire will fit loosely. The longitudinal wire will be in contact with the surface of the free rotating rollers while the transverse wire shall be supported by the anvil on each side of the slot. The bottom jaws of the testing machines shall grip the lower end of the longitudinal wire and the load shall be applied at a rate of stressing not to exceed 100 000 psi (689 MPa)/min.

12. Number of Tests

12.1 One test for conformance with the provisions of 6.1 shall be made for each 75 000 ft² (6968 m²) of fabric, or remaining fraction thereof.

12.2 One specimen for each 300 000 ft² (27 870 m²) of fabric, or remaining fraction thereof and as defined in 10.3, shall be tested for conformance to the requirements of 7.2.

13. Sizes, Spacing Deformations, and Dimensions

13.1 Sizes, spacing, presence of deformations, arrangement of wires, and dimensions of units in flat sheet form or rolls shall conform to the requirements specified by the purchaser.

14. Width of Fabric

14.1 The width of the fabric shall be considered to be the center-to-center distance between outside longitudinal wires. The permissible variation shall not exceed $\frac{1}{2}$ in. (13 mm) greater or less than the specified width.

14.2 Transverse wires shall not project beyond the centerline of each longitudinal edge

wire more than a distance of 1 in. (25 mm) unless otherwise specified.

14.3 When transverse wires are specified to project a specific length beyond the centerline of a longitudinal edge wire, the permissible variation shall not exceed $\frac{1}{2}$ in. (13 mm) greater or less than the specified length; however, the over-all width (total of projection one side plus width plus projection other side) shall not exceed 1 in. (25 mm) greater or less than specified.

15. Variations in Wire Diameter and Weight

15.1 The permissible variation in weight of any deformed wire in the fabric or the permissible variation in diameter of any nondeformed wire shall conform to the tolerances prescribed in the appropriate wire specification before fabrication (see Section 5). Such measurements shall be made between the welds.

16. Spacings

16.1 The average spacing of wires shall be such that the total number of wires contained in a sheet or roll is equal to, or greater than, that determined by the specific spacing, but the center-to-center distance between individual members may vary not more than $\frac{1}{4}$ in. (6.35 mm) from the specified spacing. It is understood that sheets of fabric of the same specified length may not always contain an identical number of transverse wires and, therefore, may have various lengths of longitudinal overhang.

17. Over-All Dimensions

17.1 The over-all length of flat sheets, measured on any wire, may vary ± 1 in. (25.4 mm) or 1 percent, whichever is greater.

17.2 In case the width of flat sheets or rolls is specified as the over-all width (tip-to-tip length of cross wires), the width shall be not more than ± 1 in. (25.4 mm) of the specified width.

18. Rolls or Sheets

18.1 Welded wire fabric may be furnished either in flat sheets or in rolls as specified by the purchaser.

19. Packaging

19.1 When fabric is furnished in flat sheets,

⁵ The detailed drawing may be obtained from ASTM Headquarters, 1916 Race St., Philadelphia, Pa. 19103. Request Adjunct No. 12-101850-00.

it shall be assembled in bundles of convenient size containing not more than 150 sheets securely fastened together.

19.2 When fabric is furnished in rolls, each roll shall be secured so as to prevent unwinding during shipping and handling.

19.3 When specified in the purchase order, packaging shall be in accordance with the procedures in Recommended Practices A 700.

20. Marking

20.1 Each bundle of flat sheets and each roll shall have attached thereto a suitable tag bearing the name of the manufacturer, a description of the material, and such other information as may be specified by the purchaser.

20.2 *For Government Procurement Only*—When specified in the contract or order, and for direct procurement by or direct shipment to the U.S. government, material shall be preserved, packaged, and packed in accordance with the requirements of MIL-STD-163. The applicable levels shall be as specified in the contract. Marking for shipment of such material shall be in accordance with Fed. Std. No. 123 for civil agencies and MIL-STD-129 for military agencies.

21. Inspection

21.1 The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed to all parts of the manufacturer's works that concern the manufacture of the material ordered. The manufacturer shall afford the inspector all reasonable facilities to satisfy him that the material is being furnished in accordance with this specification.

21.2 Except for yield strength, all tests and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified. Such tests shall be so conducted as not to interfere unnecessarily with the operation of the works.

21.3 If the purchaser considers it desirable to determine compliance with the yield strength requirements of Specifications A 496 or A 82, he may have yield strength tests made in a recognized laboratory, or his representative may make the test at the mill if such tests do not interfere unnecessarily with the mill operations.

21.4 *For Government Procurement Only*—Except as otherwise specified in the contract, the contractor is responsible for the performance of all inspection and test requirements specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other suitable facilities for the performance of the inspection and test requirements specified herein, unless disapproved by the purchaser at the time of purchase. The purchaser shall have the right to perform any of the inspections and tests at the same frequency as set forth in this specification where such inspections are deemed necessary to assure that material conforms to prescribed requirements.

22. Rejection and Retests

22.1 Material that does not meet the requirements of this specification may be rejected. Unless otherwise specified, any rejection shall be reported to the manufacturer within 5 days from the time of selection of test specimens.

22.2 In case a specimen fails to meet the tension or bend test, the material shall not be rejected until two additional specimens taken from other wires in the same sheet or roll have been tested. The material shall be considered as meeting this specification in respect to any prescribed tensile property provided the tested average for the three specimens, including the specimen originally tested, is at least equal to the required minimum for the particular property in question; and further provided that none of the three specimens develops less than 80 percent of the required minimum for the tensile property in question. The material shall be considered as meeting this specification in respect to bend test requirements provided both additional specimens satisfactorily pass the prescribed bend test.

22.3 Any material that shows injurious imperfections subsequent to its acceptance at the manufacturer's works may be rejected and the manufacturer shall be promptly notified.

22.4 Welded joints shall withstand normal shipping and handling without being broken, but the presence of broken welds, regardless of cause, shall not constitute cause for rejection unless the number of broken welds per sheet exceeds 1 percent of the total number of joints in a sheet, or if the material is furnished in rolls, 1 percent of the total number of joints in

150 ft² (14 m²) of fabric and, furthermore, provided not more than one half the permissible maximum number of broken welds are located on any one wire.

22.5 In case of rejection by reason of failure to meet the weld shear requirements, four additional specimens shall be taken from four different sheets or rolls and tested in accordance with 8.2. If the average of all the weld shear tests does not meet the requirement, the material shall be rejected.

22.6 In case rejection is justified by reason of failure to meet the requirements for dimensions, the amount of material rejected shall be limited to those individual sheets or rolls which fail to meet the requirements of this specifica-

tion. If, however, the total number of sheets or rolls thus rejected exceeds 25 percent of the total number in the shipment, the entire shipment may be rejected.

22.7 Rust, surface seams, or surface irregularities will not be cause for rejection, provided the minimum dimensional cross-sectional area and tensile properties of a hand wire-brushed test specimen are not less than the requirements of this specification.

23. Rehearing

23.1 Rejected materials shall be preserved for a period of at least 2 weeks from the date of inspection, during which time the manufacturer may make claim for a rehearing and retesting.

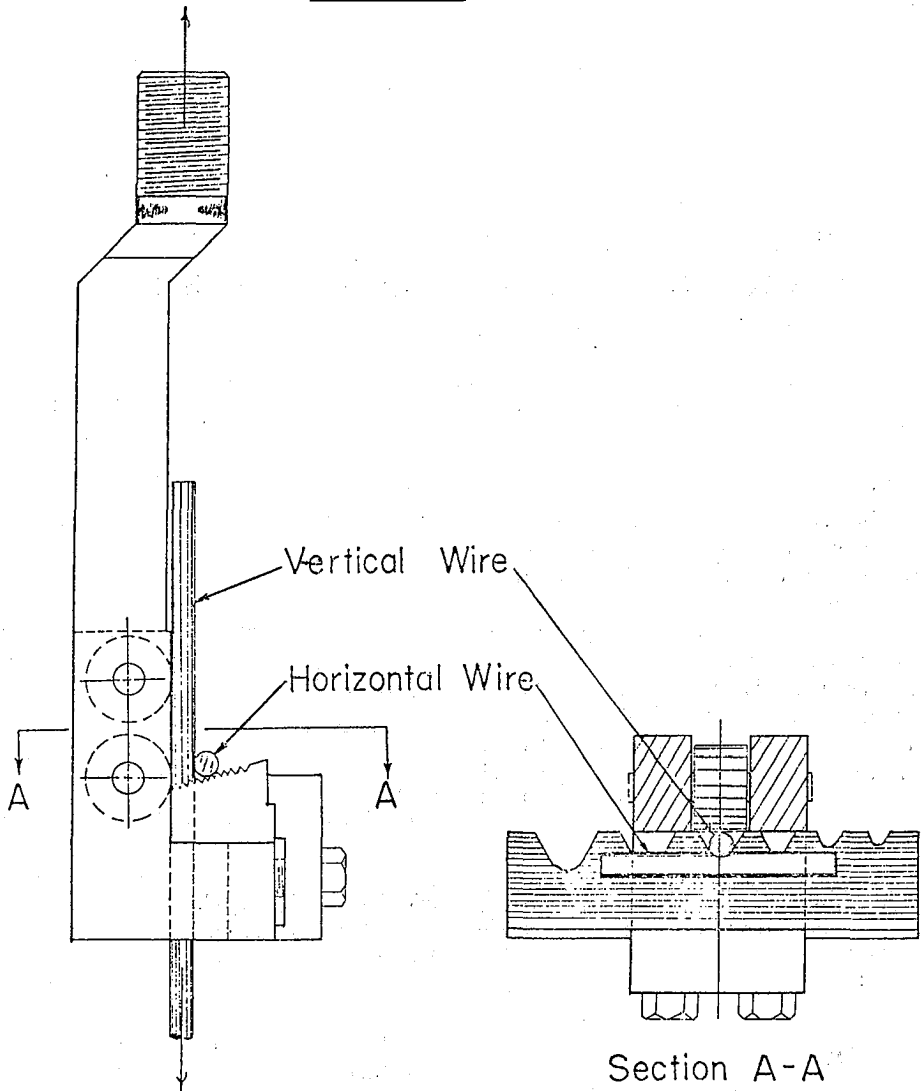


FIG. 1 Welded Wire Fabric Weld Tester.

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